

## PATENT ABSTRACTS OF JAPAN

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## (54) CURABLE COMPOSITION

## (57)Abstract:

PURPOSE: To provide a curable composition leaving no tack after cured, also capable of giving cured products with improved mechanical properties.

CONSTITUTION: The objective curable composition comprises (A) a compound having at least one alkenyl group in the molecule, (B) a compound having at least two hydrosilyl groups in the molecule, (C) a hydrosilylating catalyst, and (D) a compound having at least two hydroxyl groups in the molecule. It is preferable that the composition be incorporated with a stability improver, and it is further preferable that the component A be an oligomer consisting of a polyether main chain 500-50000 in number-average molecular weight.

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CLAIMS

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[Claim(s)]

[Claim 1] Hardenability constituent which uses four following component (A) - (D) as a principal component;

(A) The compound which has at least two hydroxyl groups in the compound which has at least one alkenyl radical in a molecule, the compound which has at least two hydrosilyl radicals in the (B) molecule, (C) hydrosilylation catalyst, and the (D) molecule.

[Claim 2] Furthermore, the constituent containing a storage stability amelioration agent according to claim 1.

[Claim 3] The constituent according to claim 1 whose compound which has at least one alkenyl radical in intramolecular is the oligomer which number average molecular weight consists of with the polyether principal chain of 500-50,000.

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[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to a hardenability constituent. Furthermore, it is related with the hardenability constituent with which the surface tuck and mechanical property after hardening which use as a principal component the compound which has at least two hydroxyl groups in detail in the compound which has at least one alkenyl radical in a molecule, the compound which has at least two hydrosilyl radicals in a molecule, a hydrosilylation catalyst, and a molecule were improved.

[0002]

[Description of the Prior Art] Conventionally, since it has fast curability at an elevated temperature, the hardenability constituent which uses the (C) component (above-mentioned [A]) as a principal component is considered as a constituent with which the expansion to various applications is expected. However, in many cases, this constituent had after hardening the big fault that adhesiveness (surface tuck) remained in that front face.

[0003] Thus, when the surface tuck remained and it uses for the application of a seal agent, a sealing material, a coating, the heat-resistant masking tape for printed circuit boards, etc., problems, such as adhesion of dust, earth and sand, etc. or a base comrade's adhesion, generate and are not desirable.

[0004]

[Problem(s) to be Solved by the Invention] The surface tuck after hardening does not remain and this invention offers the hardenability constituent which raises the mechanical property of a hardened material.

[0005]

[Means for Solving the Problem] That is, this invention is a hardenability constituent which uses four following component (A) - (D) as a principal component:

(A) The compound which has at least two hydroxyl groups in the compound which has at least one alkenyl radical in a molecule, the compound which has at least two hydrosilyl radicals in the (B) molecule, (C) hydrosilylation catalyst, and the (D) molecule. It considers as the contents.

[0006] There is especially no limit as a compound which is the (A) component of this invention and which has at least one alkenyl radical in a molecule, and various kinds of things which result from a low molecular weight compound at an organic polymer can be used. As an alkenyl radical, especially a limit is a formula (I), although there is nothing.

[0007]

[Formula 1]

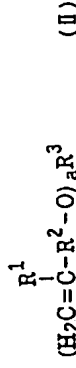


(— the alkenyl radical shown by hydrogen or methyl group) is suitable for R<sup>1</sup> among a formula.

(A) When a component is described concretely, it is a formula (II) first.

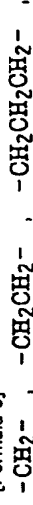
[0008]

[Formula 2]



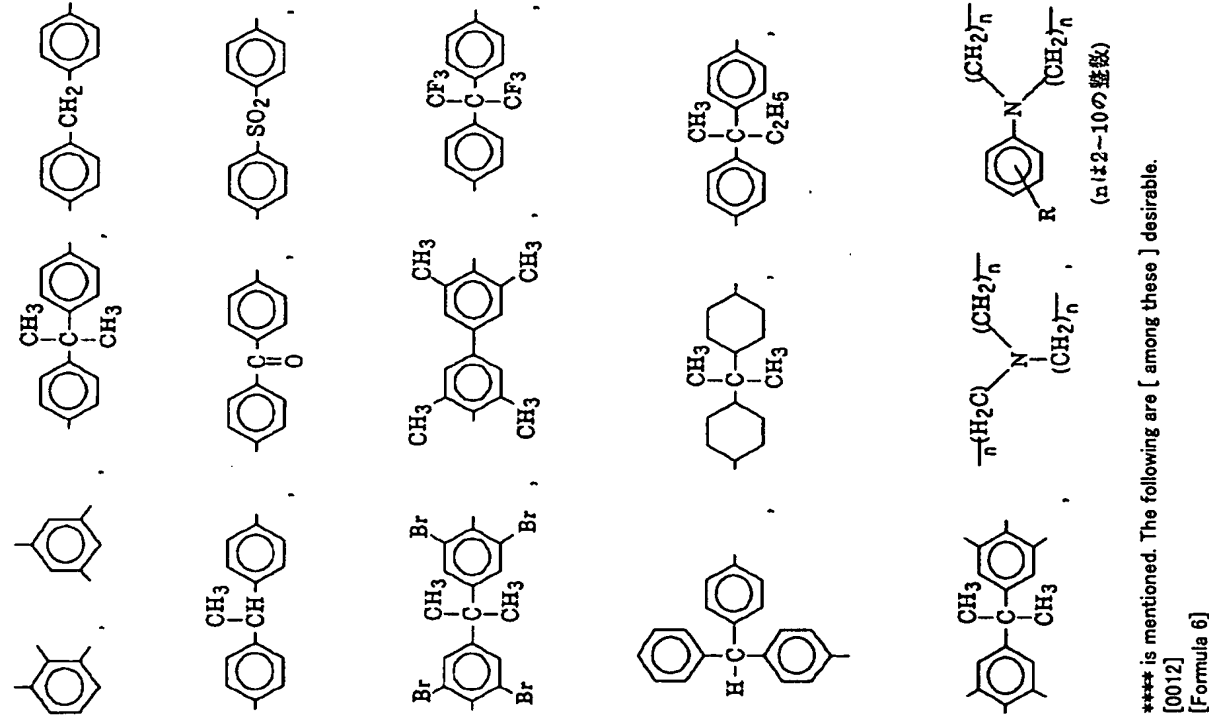
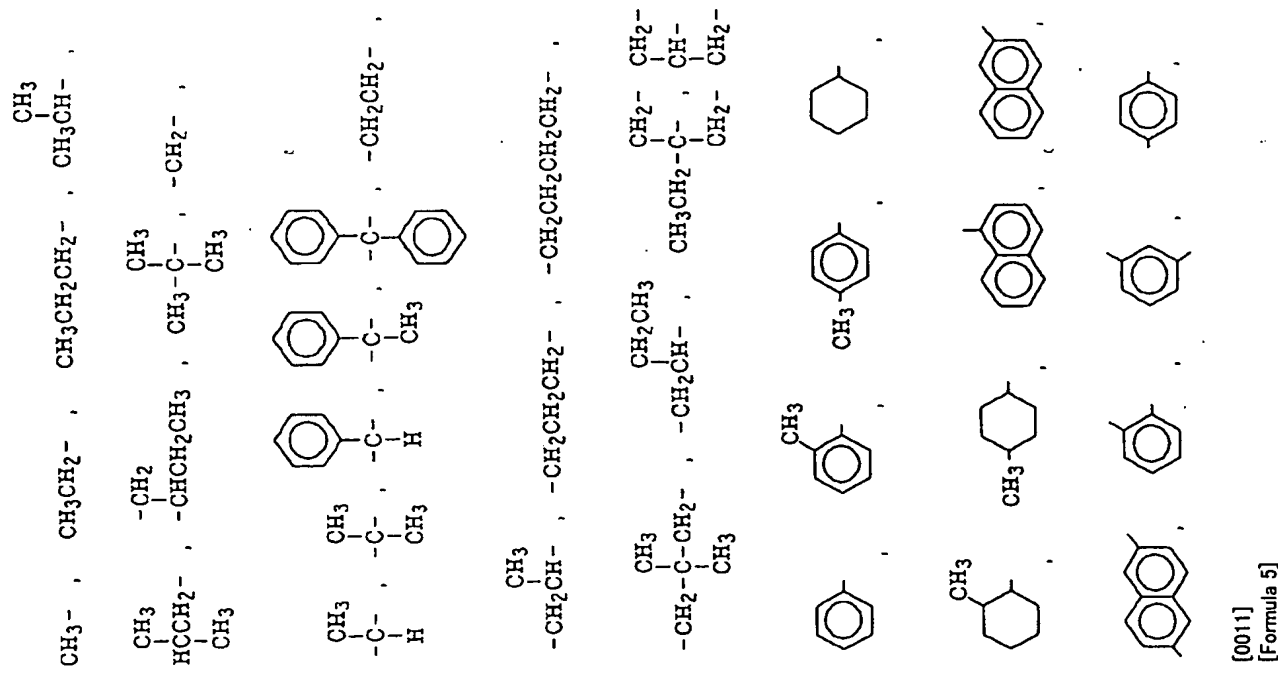
(One or more ether linkage may contain hydrogen or methyl, and R<sup>2</sup> for R<sup>1</sup> by the divalent hydrocarbon group of carbon numbers 1-20.) R<sup>3</sup> The organic radical of aliphatic series or aromatic series and a are a positive integer. The compound which has the ether linkage expressed is mentioned. The inside of a formula (II), and R<sup>2</sup> it is R<sup>2</sup> although the divalent hydrocarbon group of carbon numbers 1-20 is expressed. One or more ether linkage may contain in inside. Specifically, it is [0009].

[Formula 3]



\*\*\*\* is mentioned. -CH<sub>2</sub>- is desirable from the ease on composition. The inside of a formula (II), and R<sup>3</sup> it is the organic radical of aromatic series or an aliphatic series system. It will be [0010] if shown concretely.

[Formula 4]



\*\*\* is mentioned. The following are [ among these ] desirable.

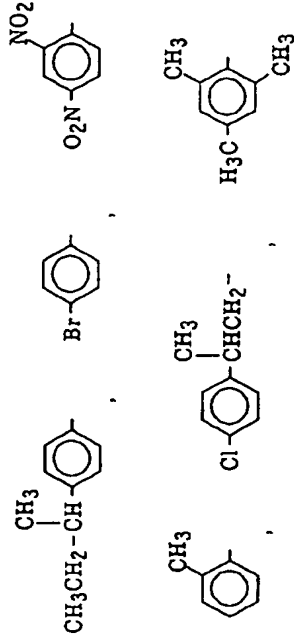
[0012]

[Chemical structure of a substituted benzene ring with a carboxylic acid group and a methyl group, labeled as [Formula 6].]

**[0011]**

[Formula 5]

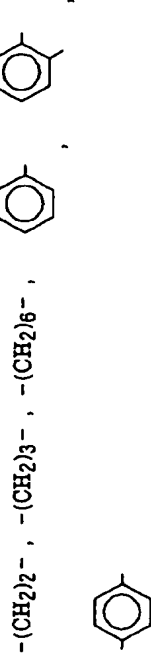




\*\*\*\* is mentioned. The following are [ among these ] desirable.

[0018]

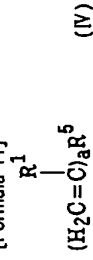
[Formula 10]



R4 You may be an organic polymer and all the organic polymers illustrated with the ether system compound of a formula (II) can be used suitably. Next, a general formula (IV)

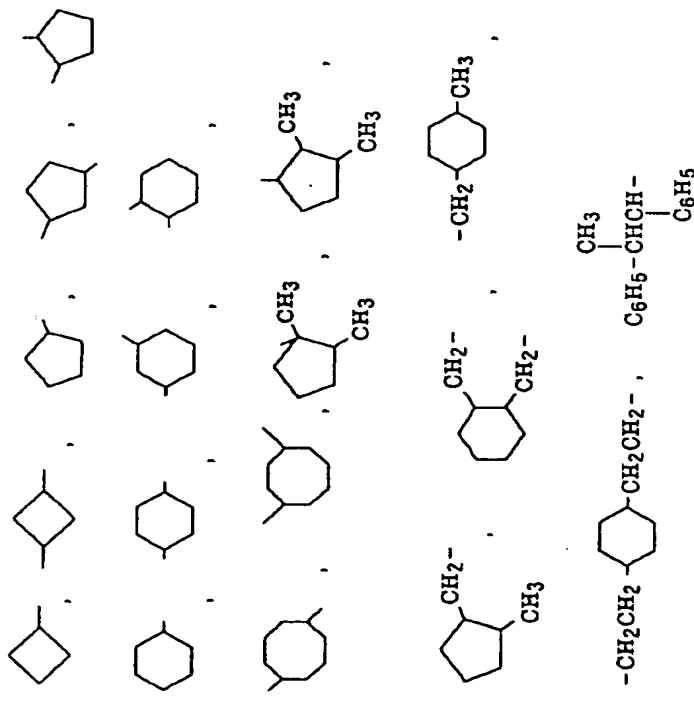
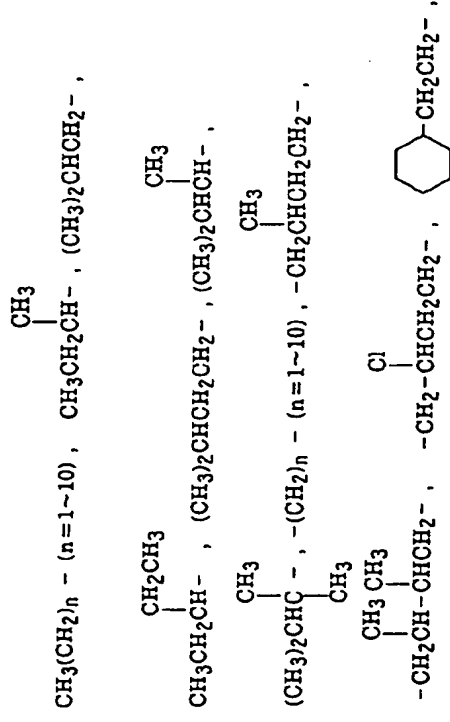
[0019]

[Formula 11]



As for (R1, the compound in which hydrogen or a methyl group, and R5 are shown by the organic radical of aliphatic series or aromatic series, and a is shown by positive integer) is mentioned. The inside of a formula (IV), and R5 Although the organic radical of aliphatic series or aromatic series is expressed, specifically, it is [0020].

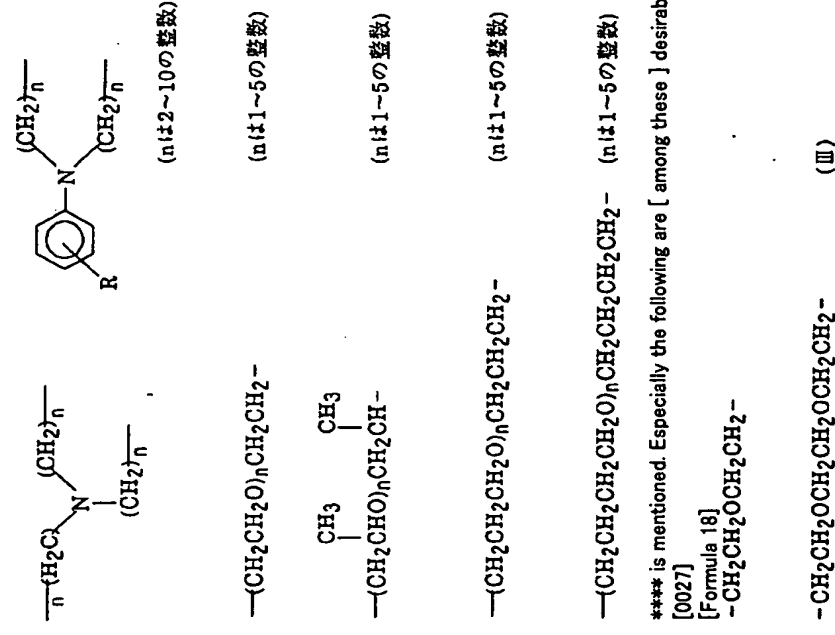
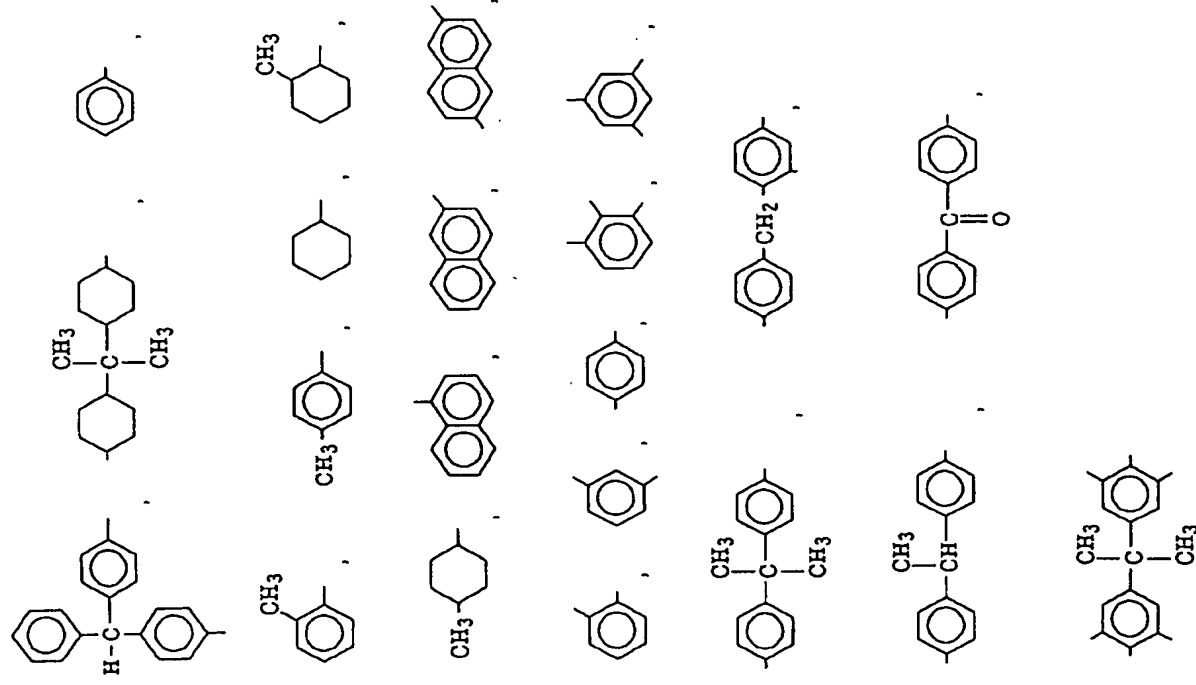
[Formula 12]



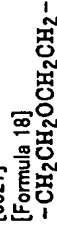
[0021]

[Formula 13]





\*\*\*\* is mentioned. Especially the following are [ among these ] desirable.  
[0027]



R6 You may be an organic polymer and all the organic polymers illustrated by explanation of a formula (II) can be used suitably. (A) Although what is proposed variously can be used about the approach of introducing an alkenyl radical into a polymer as a component when using an organic polymer, it can divide roughly into the approach of introducing after a polymerization, and the approach of introducing during a polymerization.

[0028] An alkenyl radical can be introduced into an end, a principal chain, or a side chain by making the active group which shows reactivity to an end, a principal chain, or a side chain to the above-mentioned functional group as an approach of introducing an alkenyl radical after a polymerization at the polymer which has functional groups, such as a hydroxyl group and an alkoxide radical, for example, and the organic compound which has an alkenyl radical react. As an example of the organic compound which has the active group and alkenyl radical which show reactivity to the above-mentioned functional group The unsaturated fatty acid of C3-C20, such as an acrylic acid, a methacrylic acid, a vinyl acetic acid, acrylic-acid chloride, and an acrylic-acid star's picture. The unsaturated fatty acid permatation carbonic acid halide of C3-C20, such as acid halide, an acid anhydride, and allyl compound chloro formate, silyl compound BUROMO



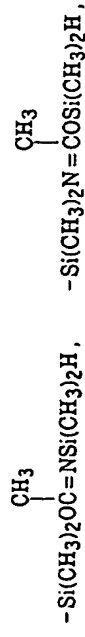
formate. An allyl chloride, an allyl compound star's picture, vinyl (chloromethyl) benzene, Allyl compound (chloromethyl) benzene, allyl compound (bromomethyl) benzene. The allyl compound (chloromethyl) ether, allyl compound (chloro methoxy) benzene, 1-butenyl (chloromethyl) ether, 1-hexenyl (chloro methoxy) benzene, allyloxy (chloromethyl) benzene, etc. are mentioned.

[0029] As an approach of introducing an alkanyl radical during a polymerization, when manufacturing, for example by the radical polymerization method, an alkanyl radical can be introduced into the principal chain of a polymer, or an end by using radical chain transfer agents, such as a vinyl monomer which has the low alkanyl radical of radical reaction nature, and allyl mercaptan, into molecules, such as allyl compound methacrylate and allyl compound acrylate. [0030] Although a line or the letter of branching is sufficient as an alkanyl radical content organic polymer and the thing of the arbitration of 500-50000 can use molecular weight suitably, especially the thing of 1000-20000 is desirable. Although an alkanyl radical may be in a molecule end or you may be in a molecule, when creating a rubber-like hardened material using the constituent of this invention, since the direction in a molecule end becomes long, effective-network-chain length has it. [desirable]

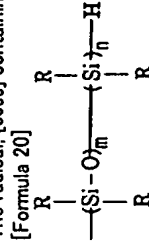
[0031] As an organic compound which is the (B) component of this invention and which has at least two hydroxyl radicals in a molecule, especially a limit will be [0032], if the radical containing a hydroxyl radical is illustrated concretely, although there is nothing.


$$(n=1\sim 3), \quad -\text{SiH}_2(\text{C}_6\text{H}_{13})\text{などのケイ素原子1個だけ含有する}$$

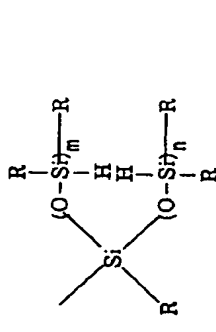
ヒドロキシ基、 $-\text{Si}(\text{CH}_3)_2\text{Si}(\text{CH}_3)_2\text{H}$ 、 $-\text{Si}(\text{CH}_3)_2\text{CH}_2\text{CH}_2\text{Si}(\text{CH}_3)_2\text{H}$ 、



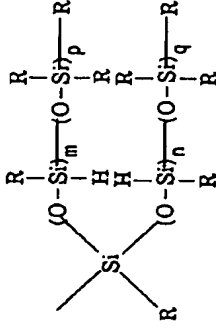
The radical, [0033] containing which two silicon atoms



among the formula, R is a radical as which H, OSi (CH<sub>3</sub>)<sub>3</sub>, and a carbon number are chosen from the organic radical of 1-10, and even if each R is the same, it may differ. m and n are positive integers and are 2 ≤ m+n ≤ 50.

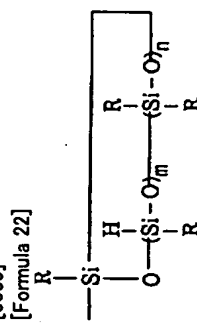


(R, m, n は上記に同じ)



(the inside of a formula, and R -- the above -- the same -- m -- a positive integer, n, p and q, or a positive integer -- it is -- 1 <= m+n+p+q <= 50 [ and ] )

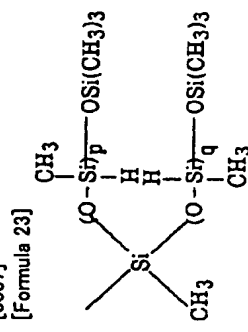
[0035]



(the inside of a formula, and R — the above — the same — m — a positive integer and n — 0 or a positive integer — it is — 2 (<m+n<=50 [ and ] etc. — the radical guided from the shape of a chain shown, the letter of branching, and various kinds of annular multiple-valued hydrogen siloxanes is mentioned.

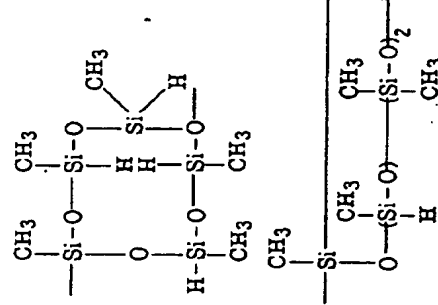
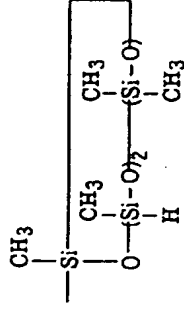
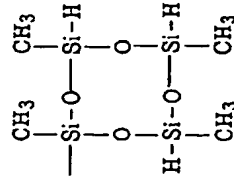
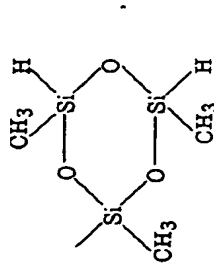
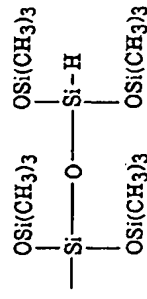
[0036] As for the molecular weight of the part of the radical which constitutes a hydrosilyl radical from a point that there is little possibility of spoiling the compatibility over the (A) component of the hydrosilyl radical content compound of this invention among various kinds of above-mentioned hydrosilyl radicals, 500 or less are desirable, and the following are desirable if the reactivity of a hydrosilyl radical is also further taken into consideration.

[0037]



( $p$  is 0 or a positive integer among a formula, and a positive integer and  $q$  are  $2 \leq p+q \leq 4$ )

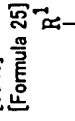
[Formula 24]



When two or more hydrosilyl radical content radicals exist in the same molecule, even when they are mutually the same, even if they differ, they are not cared about. (B) About the number of the total hydrosilyl radical contained in a component, at least, although what is necessary is just to be in [ two ] 1 molecule, 2-15 pieces are desirable and especially 3-12 pieces are desirable. In mixing with the compound ((A) component) containing an alkenyl radical and stiffening the hydrosilyl radical content compound of this invention by the hydrosilylation reaction under hydrosilylation catalyst existence, if there is less number of this hydrosilyl radical than 2, it will cause poor hardening in many cases. Moreover, if the number of this hydrosilyl radical increases more than 15, the stability of the (B) component worsens, a lot of hydrosilyl radicals will remain in a hardened material, and after hardening will cause a void and a crack.

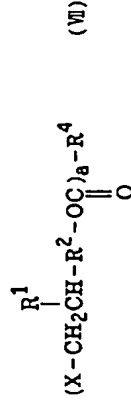
[0039] (B) Although there is especially no limit as a hydrosilyl radical content compound of a component, various kinds of compounds to a polymer from the thing of low molecular weight can be used. It is a formula (VI) when it illustrates concretely.

[Formula 25]



(--- the respectively same thing as R1 in a formula (II), R2, and R3 can be used for the radical which has one or more hydrosilyl radicals of the above [ X ], R1, R2, and R3 among a formula.) --- the compound and formula (VII) which have the ether linkage expressed

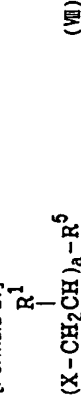
[Formula 26]



(--- the respectively same thing as R1 in a formula (III), R2, and R4 can be used for the radical which has one or more hydrosilyl radicals of the above [ X ], R1, R2, and R4 among a formula.) --- the compound and formula (VIII) which have the ester bond expressed

[0042]

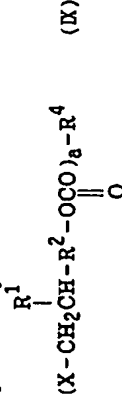
[Formula 27]



(--- the respectively same thing as R1 in a formula (IV) and R5 can be used for the radical which has one or more hydrosilyl radicals of the above [ X ], R1, and R5 among a formula.) --- the compound of the hydrocarbon system expressed --- further --- formula (IX)

[0043]

[Formula 28]



(--- the respectively same thing as R1 in a formula (V), R2, and R6 can be used for the radical which has one or more hydrosilyl radicals of the above [ X ], R1, R2, and R6 among a formula.) --- the compound which has carbonate association expressed can be mentioned.

[0044] (B) Although a line or the letter of branching is sufficient as a polymer and the thing of the arbitration of 500-50000 can use molecular weight suitably when using an organic polymer as a component, especially the thing of 500-20000 is desirable. (B) Although it may be in a molecule end or you may be in a molecule, when producing a rubber-like hardened material using the constituent of this invention, since the direction in a molecule end becomes long, effective-network-chain length is desirable [ the hydrosilyl radical of a component / the direction ].

[0045] (B) As the manufacture approach of a component, there is especially no limit and it should just use the approach of arbitration. for example, the organic compound which has a Si-Cl radical in (a) intramolecular --- LiAlH4 and NaBH4 etc. --- the approach of processing with a reducing agent and returning the Si-Cl radical in this compound to a Si-H radical --- (b) The approach to which an organic compound with the functional group X in intramolecular and the compound which has at intramolecular the above-mentioned functional group, and the functional group Y which reacts and a hydrosilyl radical in coincidence are made to react, (c) By carrying out selection hydrosilylation of the poly hydrosilane compound which has at least two hydrosilyl radicals to an organic compound with an alkenyl radical, after a reaction can consider how to make a hydrosilyl radical remain in the molecule of this compound etc. Especially the approach of (c) is [ among these ] desirable.

[0046] (A) As combination of a component and the (B) component, although the thing of arbitration is combinable, it is desirable that both the (A) component, and (B) both [ either or ] are organic polymers, and it is desirable that the (A) component is a polypropylene oxide system polymer also in it. (A) Since the crosslinking density of the hardened material obtained as both a component and the (B) component are low molecular weight compounds becomes high and becomes weak, as a hardenability constituent, it is not desirable.

[0047] (C) As a hydrosilylation catalyst which is a component a complex with the thing which made support, such as a simple substance of platinum, an alumina, a silica, and carbon black,

support solid-state platinum, chloroplatinic acid, chloroplatinic acid, alcohol, an aldehyde, a ketone, etc., and a platinum-olefin complex — [— for example Pt(CH<sub>2</sub>=CH<sub>2</sub>)<sub>2</sub> — a 2 (PPh<sub>3</sub>) Pt(CH<sub>2</sub>=CH<sub>2</sub>)<sub>2</sub> Cl<sub>2</sub>], platinum-vinyl siloxane complex — [— for example a P<sub>tn</sub> m (VMe<sub>2</sub> SiOSiMe<sub>2</sub> V) and Pt[(MeVSiO<sub>4</sub>) m]; platinum-phosphine complex — [— for example Pt(PPh<sub>3</sub>)<sub>4</sub>, Pt(PBu<sub>3</sub>)<sub>3</sub>], a platinum-phosphite complex (For example, Pt[P(OPh)<sub>3</sub>]<sub>4</sub>) the inside of a formula, and Me — a methyl group — In Bu, butyl and Vi express a vinyl group, Ph expresses a phenyl group, and m and n express an integer, dicarbonyl dichloro platinum and Ashby's (Ashby) United States patent 3159601st — and The platinum alcoholate catalyst indicated in the U.S. Pat. No. 3220972 specification of RAMORO (Lamoreaux) is also mentioned to the platinum-hydrocarbon complex indicated in the No. 3159682 specification, and a list. Furthermore, the platinum chloride-olefin complex indicated in Modic's (Modic) U.S. Pat. No. 3516946 specification is also useful in this invention.

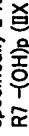
[0048] moreover — as the example of catalysts other than a platinum compound — RhCl(PPh<sub>3</sub>)<sub>3</sub>, RhCl<sub>3</sub>, H<sub>2</sub>Al<sub>2</sub>O<sub>3</sub>, RuCl<sub>3</sub>, IrCl<sub>3</sub>, FeCl<sub>3</sub>, AlCl<sub>3</sub>, PdCl<sub>2</sub> and 2H<sub>2</sub>O, NiCl<sub>2</sub>, and TiCl<sub>4</sub> etc. — it is mentioned. These catalysts may be used independently, and even if it uses two or more sorts together, they are not cared about. Chloroplatinic acid, a platinum-olefin complex, a platinum-acetylacetonato complex, and a platinum-vinyl siloxane complex are desirable from the point of catalytic activity, moreover, the thing which does not contain a halogen atom in the hydrosilylation catalyst of the above and a platinum system in applying this constituent to the application of the circumference of the electrical and electric equipment and an electron — desirable — for example, Pt(acac)<sub>2</sub> etc. — it can be used suitably.

[0049] Although there is especially no limit as an amount of catalysts, it is good to use in the range of 10-1 to ten to 8 mol to one mol of alkenyl radicals in the (A) component. It is good to use in the range of 10-3 to ten to 6 mol preferably. If fewer than ten to 8 mol, hardening will not fully advance. Moreover, it is better not to use for a large quantity from ten to 1 mol, since a hydrosilylation catalyst is generally expensive, and it is \*\*\*\*\* and hydrogen gas is generated in large quantities and a hardened material may foam.

[0050] Since a hardenability constituent hardens by the addition reaction of the Si-H radical to the alkenyl radical using a precious metal catalyst, a cure rate is very quick, and it is convenient when performing Rhine production. (B) Since the hydrosilylation catalyst is included in the (B) component also after the reaction when manufacturing the hydrosilyl radical content compound which is a component by the above-mentioned selection hydrosilylation, if the stability generally is not good, it is left for a long period of time or hygroscopic moisture mixes, the inversion to Si-OH radical of a Si-H radical will take place, and phenomena, such as viscosity increase and gelation, will be seen. Therefore, it is desirable to make a storage stability amelioration agent contain in the (B) component. As such a compound, the compound containing an aliphatic series unsaturated bond, an organic phosphorous compound, an organosulfur compound, a nitrogen content compound, a tin system compound, organic peroxide, etc. can be used suitably.

Benzothiazole, thiazole, dimethylmalate, 2-pentene nitril, 2, and 3-dichloropropene etc. is mentioned, and especially, in respect of coexistence of pot life/fast curability, although a thiazole is desirable, specifically, it is not necessarily limited to these. Although it can be mostly chosen as arbitration as long as the amount of the storage stability amelioration agent used is distributed for the (A) component and the (B) component at homogeneity, it is desirable to use in the range of 10-6 to ten to 1 mol to one mol of Si-H radical content compounds of the (B) component. This is because hardening will be checked in less than ten — six mols if the storage stability of the (B) component is not fully improved but exceeds ten to 1 mol. A storage stability amelioration agent may be used independently, or may mix and use two or more sorts.

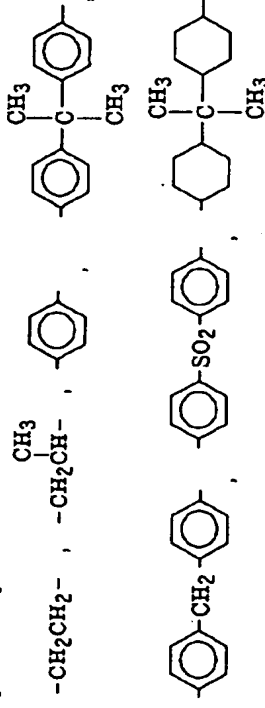
[0051] As a compound which has at least two hydroxyl groups in the molecule which is the (D) component of this invention, there is nothing, various kinds of things which result from a low molecular weight compound at an organic polymer can be used, and especially a limit is specifically a formula (IX).



(— the compound by which it is expressed with the organic radical of p \*\* as for the inside R<sup>7</sup> of a formula, and p is expressed with two or more integers) is mentioned.

[0052] The inside of a formula (IX), and R<sup>7</sup> it is R<sup>7</sup> although the organic radical of p \*\* is expressed. It will be [0053] if shown still more concretely.

[Formula 29]



\*\* and the following organic polymers can be used. First, as a polyether system polymer, a polyoxyethylene, polyoxypropylene, polyoxy tetramethylen, and polyoxyethylene-polyoxypropylene copolymer etc. is used suitably, for example. As a polymer with other principal chain frames, the condensation of dibasic acid, such as an adipic acid, and a glycol, or the polyester system polymer, ethylene-propylene system copolymer which are obtained by the ring opening polymerization of lactone. The copolymer of a polyisobutylene, an isobutylene, an isoprene, etc., poly chloro BUREN, A copolymer with polyisoprene, an isoprene, a butadiene, acrylonitrile, styrene, etc., A copolymer with polybutadiene, a butadiene, styrene, acrylonitrile, etc., Polyisoprene, polybutadiene, an isoprene, or a butadiene and acrylonitrile. The polyolefine system polymer which hydrogenates a copolymer with styrene etc. and is obtained. Acrylic ester, such as ethyl acrylate and butyl acrylate, ethyl acrylate, and butyl acrylate, An acrylic ester system copolymer with vinyl acetate, acrylonitrile, methyl methacrylate, styrene, etc., The graft polymer obtained by carrying out the polymerization of the vinyl monomer in the inside of said organic polymer, A polysulfide system polymer, Nylon 610 by the condensation polymerization of the nylon 6 by the ring opening polymerization of epsilon caprolactam, a hexamethylenediamine, Nylon 66 by the condensation polymerization of an adipic acid and a hexamethylenediamine, a sebacic acid, Nylon 11 by the condensation polymerization of epsilon-amino undecanoic acid, The inside of Nylon 12 by the ring opening polymerization of epsilon-amino lauro lactam, and the above-mentioned nylon, Polyamide system polymers, for example, the polycarbonate system polymer manufactured by carrying out condensation polymerization from bisphenol A and a carbonyl chloride, such as copolyamide which has a two or more-component component, a diallyl phthalate system polymer, etc. are illustrated. Furthermore, the polyhydric phenols represented by bisphenol A and phenol resin and aliphatic series polyhydric alcohol, the hydroxyl-group end of the poly caprolactone, the oligomer of molecular weight 1,000-20,000 that have crystallinity like a polytetramethylene glycol (PTMG), and the oligomer of the molecular weight 1,000-20,000 of amorphism nature like the polypropylene PIRENGURI ether can be used.

[0054] (D) The amount of the component used has the desirable range of 0.1 - 50 weight section to the (aforementioned A) + (B) component 100 weight section. When its effectiveness of the surface tack disappearance after hardening is inadequate if the reason has few (D) components than the 0.1 weight section, and there is than 50 weight sections, it is for the physical properties after hardening of this constituent to fall remarkably. [ more ] To the hardenability constituent of this invention, a bulking agent, an antioxidant, an ultraviolet ray absorbent, a pigment, a surfactant, a plasticizer, a silane coupling agent, etc. may be added suitably if needed.

[0055] As an example of said bulking agent, silica impalpable powder, a calcium carbonate, clay, talc, titanium oxide, a zinc white, the diatom earth, a barium sulfate, carbon black, etc. are mentioned, for example.

[0056]

[Example] Next, although an example explains the constituent of this invention concretely, this

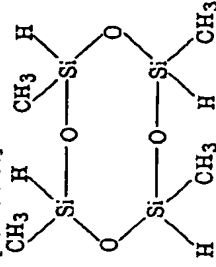
invention is not limited only to these examples.

According to the approach indicated by synthetic example 1 JP,53-134095,A, the polyoxypropylene which has an allyl compound mold olefin radical at the end was compounded. [0057] The polyoxypropylene glycol and powder caustic alkali of sodium which are average molecular weight 3000 were stirred at 60 degrees C, it reacted by having added bromochloromethane, and molecular weight was increased. Next, the allyl chloride was added and allyl compound etherification of the end was carried out at 110 degrees C. This was processed with the aluminum silicate and purification end allyl compound etherification polyoxypropylene was compounded.

[0058] The average molecular weight of this polyether was 7960, and 92% of the end was an olefin radical from the iodine number. The viscosity by E mold viscometer was 130poise (40 degrees C).

What attached the equalization dropping funnel, the thermometer, the magnetic chip, and the glass stopper for the cooling pipe with the method cock of three was prepared for 4 opening flask of 2200ml of synthetic examples. N2 It is an annular polyhydrogen siloxane [0059] under an ambient atmosphere.

[Formula 30]



(The Shin-etsu chemistry incorporated company make, LS8600) 12.03g (50mmol) and toluene 20ml were taught in the flask. 1 and 9-deca diene 2.76g (20mmol) and the thing which dissolved 20micro (solution melted tog [ 1 ] and 1 of H2 PtCl6 and 6H2 O, and 2-dimethoxyethane 9g) of chloroplatinic acid catalyst solutions l in toluene 30ml were taught into the dropping funnel. A flask is attached to a 50-degree C oil bath, and it is N2. This toluene solution was dropped over 2 hours into the flask under the ambient atmosphere. When it was made to react at 50 degrees C after dropping termination for further 1 hour and the IR spectrum was measured at the time, since absorption of the olefin of a near [ 1640cm<sup>-1</sup> ] had disappeared completely, the reaction was ended at this time. Benzothiazole (13micro, 0.12mmol) was added, it evaporated, volatile matter was removed, and the 9.11g transparent and colorless liquid was obtained. The hydrosilyl radical in this hydrocarbon system compound was checked as strong absorption of 2170cm<sup>-1</sup>. Moreover, it is the peak and Si-CH3 of Si-H at 300MHz NMR. As for this compound, by comparing the intensity ratio (actual measurement 0.216) of a proton with the intensity ratio on count showed that [n=1 (MW=998) which averages and has the structure of the following type was 53%, and n=2 (MW=1377) was 47%] mixture. When calculating the number of the Si-H radicals in a unit weight based on this, they were 0.769 mols / 100g.

The synthetic example 3 (B component \*\*)

100g [ of compounds ] and toluene 100ml obtained in the synthetic example 2 was taught in the flask. What was dissolved in 1-decene 43.1g (0.308 mols) and 3.1micro (solution which melted 1g of H2 PtCl4 and 6H2 O to ethanol [ 1 ] and 1 and 2-dimethoxyethane 9g) l toluene 50ml of chloroplatinic acid catalyst solutions was taught into the dropping funnel. A flask is attached to a 50-degree C oil bath, and it is N2. This toluene solution was dropped over 2 hours into the flask under the ambient atmosphere. When it was made to react at 50 degrees C after dropping termination for further 1 hour and the IR spectrum was measured, since absorption of the olefin of a near [ 1640cm<sup>-1</sup> ] had disappeared completely, the reaction was ended at this time.

[0060] Benzothiazole (13micro, 0.12mmol) was added, it evaporated, volatile matter was removed, and the 143g transparent and colorless liquid was obtained. The hydrosilyl radical in

this hydrocarbon system compound was checked as strong absorption of 2170cm<sup>-1</sup>. When calculating the number of the Si-H radicals in the unit weight of this compound, they were 0.317 mols / 100g.

The organic polymer ((A) component) obtained in the example 1 - the example 1 of 5 composition, the Si-H radical content compound obtained in the synthetic example 2 ((B) component), hindered phenolic antioxidant (Ciba-Geigy IRUGA NOx 1010) 1% chloroplatinic acid catalyst solution ((C) component) (what dissolved 1.0g of H2 PtCl6 and 6H2 O in ethanol 99g). After measuring the amount which shows the compound ((D) component) which has at least two hydroxyl groups in a thiazole and a molecule in Table 1, respectively and often kneading, it slushed into the shuttering of about 2mm thickness, and bottom degassing of reduced pressure was carried out. The constituent after degassing was stiffened for 10 minutes in 130-degree C oven with shuttering, and the sheet-like hardened material was created. In this way, finger touch investigated the surface tuck of the obtained sheet. Furthermore, it is JIS K7113. The dumbbell was obtained using 2 (1/3) number dumbbell cutter, and the tension test was performed. The result was collectively shown in the 1st table.

[0061]

[Table 1]

第1表

| 実施番号                                  | 1         | 2        | 3                  | 4            | 5        | 比較例1     |
|---------------------------------------|-----------|----------|--------------------|--------------|----------|----------|
| A成分重量 (g)                             | 3.73      | 3.73     | 3.73               | 3.73         | 3.73     | 3.73     |
| B成分 ①・(g)                             | 0.11      | 0.11     | 0.11               | 0.11         | —        | 0.11     |
| ②・(g)                                 | —         | —        | —                  | —            | 0.27     | —        |
| イルガノックス<br>1010 (g)                   | 0.04      | 0.04     | 0.04               | 0.04         | 0.04     | 0.04     |
| 10%チアゾール (μℓ)                         | 3.94      | 3.94     | 3.94               | 3.94         | 3.94     | 3.94     |
| 1% $H_2PtCl_6$ (μℓ)                   | 21.7      | 21.7     | 21.7               | 21.7         | 21.7     | 21.7     |
| D成分種類                                 | *<br>PTMG | PTMG     | **<br>ビスフェ<br>ノールA | ***<br>MS-OH | PTMG     | —        |
| 重量 (g)                                | 0.37      | 1.12     | 0.18               | 0.37         | 0.37     | —        |
| 表面タックの様子                              | 全く<br>なし  | 全く<br>なし | 全く<br>なし           | 全く<br>なし     | 全く<br>なし | やや<br>あり |
| 引張試験結果*                               |           |          |                    |              |          |          |
| M <sub>10</sub> (kg/cm <sup>3</sup> ) | 1.07      | 0.92     | 1.06               | 1.03         | 0.37     | 1.22     |
| M <sub>50</sub> ( . )                 | 3.51      | 3.13     | 3.53               | 3.13         | 1.12     | 3.43     |
| M <sub>100</sub> ( . )                | 5.52      | 6.01     | 6.50               | 4.90         | 1.69     | 4.99     |
| T <sub>8</sub> ( . )                  | 8.71      | 9.20     | 7.70               | 6.28         | 7.84     | 5.81     |
| E <sub>8</sub> ( % )                  | 164       | 185      | 137                | 123          | 392      | 90       |

※引張試験条件： 23℃中

引張速度 200mm/min  
チャック間 20mm

- \* PTMG： 保土谷化学工業(株)製 PTG GRADE 1000
- \*\* ビスフェノールA： 三井東圧社製，ビスフェノールA
- \*\*\* MS-OH： 合成例1で使用した平均分子量 3000の  
ポリオキシプロピレングリコール

Except not using example of comparison 1PTMG, it carried out like the example 1 and the result was collectively shown in the 1st table.

[0062]

[Effect of the Invention] The hardenability constituent of this invention understands that the surface tack after hardening is improved sharply so that clearly also from an example. Furthermore the elongation-after-fracture breaking strength of a hardened material etc. is improved, and a mechanical property is raised. It can become an ingredient useful for the application of a sealing material, a seal agent, a coating, a coating agent, the rubber for casting, the heat-resistant masking tape for printed circuit boards, etc. from these things.

[Translation done.]